NATURAL RESOURCES TECHNICAL REPORT

Replace Bridge No. 20 on SR-1152 over South Deep Creek
Yadkin County, North Carolina

TIP B-4683
Federal Aid Project No. BRZ-1152(12)
WBS Element No. 38466.1.FD2

THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Project Development and Environmental Analysis Unit
Natural Environment Section

June 2015

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1.0 INTRODUCTION

The North Carolina Department of Transportation (NCDOT) proposes to replace bridge number 20 on SR-1152 (Neelie Rd.) over South Deep Creek in Yadkin County (Figure 1). The following Natural Resources Technical Report (NRTR) has been prepared to assist in the preparation of a Categorical Exclusion (CE) for the proposed project.

2.0 METHODOLOGY AND QUALIFICATIONS

All work was conducted in accordance with the NCDOT Natural Environment Section standard operating procedures and July 2012 NRTR template. Field work was conducted on March 4, 2015. Jurisdictional areas identified in the study area have not yet been verified by the U.S. Army Corps of Engineers (USACE) or the North Carolina Division of Water Resources (NCDWR). The principal personnel contributing to this document were:

Principal Investigator: Phil May
Education: B.S. Biology, 1992
Experience: Senior Scientist, Carolina Ecosystems, Inc., 2006-Present
Senior Scientist, HDR Engineering, Inc., 2001-2006
Staff Scientist, GN Richardson & Assoc. 1995-2001
Responsibilities: Wetland and stream delineations, stream assessment, natural communities assessment, T/E species assessment, document review

Principal Investigator: Brian Smith, PWS
Education: B.S. Biology, 1992; M.S. Soil Science 1998
Experience: Senior Scientist, Carolina Ecosystems, Inc., 2004-Present
Environmental Scientist, Dewberry, 2003-2004
Environmental Scientist, Blue LWI, 1998-2003
Environmental Specialist, NCDWQ, 1997-1998
Responsibilities: Wetland and stream delineations, stream assessment, natural communities assessment, T/E species assessment, document review

Additional personnel who contributed to portions of the field work and/or documentation for this project were Rob Crowther, Chris Hopper, and Joe Sullivan. Appendix D lists the qualifications of these contributors.

3.0 PHYSICAL RESOURCES

The study area lies in the piedmont physiographic region of North Carolina (Figure 2). Topography in the project vicinity is comprised of gently rolling hills with narrow, level floodplains along streams. Elevations in the study area range from 760 to 820 ft. above sea level. Land use in the project vicinity consists of forest habitat and agricultural fields.

3.1 Soils

The Yadkin County Soil Survey identifies seven soil types within the study area (Table 1).

Table 1. Soils in the study area

Soil Series	Mapping Unit	Drainage Class	Hydric Status
Banister fine sandy loam	BaB	Moderately Well Drained	Hydric*
Dan River and Cordorus soils	DhA	Well Drained	Hydric*
Dan River and Comus soils	DmA	Well Drained	Hydric*
Nathalie sandy clay loam	NeB2	Well Drained	Non-Hydric
Rhodhiss-Scott Knob complex	RdF	Well Drained	Hydric*
Toast sandy clay loam	TeD2	Well Drained	Non-Hydric
Tomlin sandy clay loam	TnC2	Well Drained	Non-Hydric

* - Soils which are primarily nonhydric, but which may contain hydric inclusions

3.2 Water Resources

Water resources in the study area are part of the Yadkin River basin [U.S. Geological Survey (USGS) Hydrologic Unit 03040101]. Two streams were identified in the study area (Table 2). The location of each water resource is shown in Figure 3. The physical characteristics of these streams are provided in Table 3.

Table 2. Water resources in the study area

Stream Name	Map ID	NCDWQ Index Number	Best Usage Classification
South Deep Creek	South Deep Creek	12-84-2-(1)	WS-III
UT 1 to South Deep Creek	SA	12-84-2-(1)	WS-III

Table 3. Physical characteristics of water resources in the study area

Map ID	Bank Height (ft)	Bankful Width (ft)	Water Depth (in)	Channel Substrate	Velocity	Clarity
South Deep Creek	4	60	18	Sand	Moderate	Clear
SA	1	4	6	Sand, Silt	Moderate	Slightly Turbid

There are no designated anadromous fish waters, trout waters, or Primary Nursery Areas (PNA) present in the study area. There are no designated Outstanding Resource Waters (ORW), High Quality Waters (HQW), or water supply watersheds (WS-I or WS-II) within 1.0 mile downstream of the study area. South Deep Creek is designated as a WS-III Critical Area (CA) from a point 0.6 miles upstream of U.S. Hwy. 601 to a point 0.1 miles downstream of U.S. Hwy. 601, approximately 0.9 mile downstream of the study area. The North Carolina 2014 Final 303(d) list of impaired waters identifies no waters within the study area or within 1.0 mile downstream of the study area as impaired due to excessive sedimentation and turbidity.

No benthic sampling locations were found within 1.0 mile of the study area. Fish samples were taken adjacent to the study area at South Deep Creek at SR-1152 (Neelie Rd). It was given a rating of "Good". Samples were taken most recently on June 16, 2011.

4.0 BIOTIC RESOURCES

4.1 Terrestrial Communities

Three terrestrial communities were identified in the study area: maintained/disturbed, mesic mixed hardwood forest (piedmont subtype), and piedmont alluvial forest. Figure 4 shows the location and extent of these terrestrial communities in the study area. A brief description of each community type follows. Scientific names of all species identified are included in Appendix B.

4.1.1 Maintained/Disturbed

Maintained/disturbed areas occur throughout the study area in agricultural fields, landscaped areas and other places where the vegetation has been periodically mowed. The vegetation in this community is often sparse or absent, but where present is comprised of low growing grasses, herbs, and trees including fescue, Japanese honeysuckle, Chinese privet, red cedar, and kudzu.

4.1.2 Mesic Mixed Hardwood Forest (Piedmont Subtype)

The mesic mixed hardwood forest (piedmont subtype) community occurs in areas where mixed hardwoods such as yellow poplar, northern red oak, and American beech are the

dominant canopy species. Virginia pines are also present, but not a significant part of the canopy. The understory consists of Chinese privet and Japanese honeysuckle.

4.1.3 Piedmont Alluvial Forest

The piedmont alluvial forest community occurs in areas where hardwoods such as yellow poplar, American sycamore, and river birch are the dominant canopy species. The understory consists of Chinese privet and Japanese honeysuckle.

4.1.4 Terrestrial Community Impacts

Terrestrial communities in the study area may be impacted by project construction as a result of grading and paving of portions of the study area. At this time, decisions regarding the final location and design of the proposed project have not been made. Therefore, community data are presented in the context of total coverage of each type within the study area (Table 4). Once a final alignment and preliminary design have been determined, probable impacts to each community type will be calculated.

Table 4. Coverage of terrestrial communities in the study area

Community	Coverage (ac.)
Maintained/ Disturbed	4.6
Mesic Mixed Hardwood Forest (Piedmont Subtype)	1.2
Piedmont Alluvial Forest	0.7
Total	**6.5**

4.2 Terrestrial Wildlife

Terrestrial communities in the study area are comprised of both natural and disturbed habitats that may support a diversity of wildlife species (those species actually observed are indicated with *). Mammal species that commonly exploit forested habitats and stream corridors found within the study area include species such as eastern cottontail, gray squirrel, raccoon, Virginia opossum, and white-tailed deer. Birds that commonly use forest and forest edge habitats include the American crow, blue jay, Carolina chickadee, tufted titmouse, and yellow-rumped warbler. Birds that may use the open habitat or water bodies within the study area include American kestrel, belted kingfisher, eastern bluebird*, eastern meadowlark, and turkey vulture*. Reptile and amphibian species that may use terrestrial communities located in the study area include the corn snake, eastern box turtle, eastern fence lizard, five-lined skink, northern dusky salamander, and rat snake.

4.3 Aquatic Communities

Aquatic communities in the study area consist of perennial streams. Perennial streams in the study area could support bluegill, bluehead chub, redbreast sunfish, redlip shiner, satinfin shiner, and tessellated darter.

4.4 Invasive Species

Three species from the NCDOT Invasive Exotic Plant List for North Carolina were found to occur in the study area. The species identified were Kudzu (Threat), Japanese honeysuckle (Moderate Threat), and Chinese privet (Threat). NCDOT will manage invasive plant species as appropriate.

5.0 JURISDICTIONAL ISSUES

5.1 Clean Water Act Waters of the U.S.

Two jurisdictional streams were identified in the study area (Table 5). The locations of these streams are shown on Figure 3. USACE and NCDWQ stream delineation forms are included in Appendix C. The physical characteristics and water quality designations of each jurisdictional stream are detailed in Section 3.2. All jurisdictional streams in the study area have been designated as warm water streams for the purposes of stream mitigation.

Table 5. Jurisdictional characteristics of water resources in the study area

Map ID	Length (ft.)	Classification	Compensatory Mitigation Required	River Basin Buffer
South Deep Creek	100	Perennial	Yes	Not-Subject
SA	68	Perennial	Yes	Not-Subject
Total	**168**			

No jurisdictional wetlands were identified within the study area (Figure 3).

5.2 Clean Water Act Permits

The proposed project has been designated as a Categorical Exclusion (CE) for the purposes of National Environmental Policy Act documentation. The USACE holds the final discretion as to what permit will be required to authorize project construction. If a Section 404 permit is required then a Section 401 Water Quality Certification (WQC) from the NCDWR will be needed.

5.3 Coastal Area Management Act Areas of Environmental Concern

Yadkin County is not under the jurisdiction of the Coastal Area Management Act.

5.4 Construction Moratoria

Yadkin County is not a designated trout county. Therefore, at this time a construction moratorium is not anticipated.

5.5 N.C. River Basin Buffer Rules

No state riparian buffer rules apply to the study area.

5.6 Rivers and Harbors Act Section 10 Navigable Waters

There are no Section 10 waters located within the study area.

5.7 Wetland and Stream Mitigation

5.7.1 Avoidance and Minimization of Impacts

The NCDOT will attempt to avoid and minimize impacts to streams and wetlands to the greatest extent practicable in choosing a preferred alternative and during project design. At this time, no final decisions have been made with regard to the location or design of the preferred alternative.

5.7.2 Compensatory Mitigation of Impacts

The NCDOT will investigate potential on-site stream and wetland mitigation opportunities once a final decision has been rendered on the location of the preferred alternative. If on-site mitigation is not feasible, mitigation (if required) will be provided by North Carolina Department of Environment and Natural Resources Division of Mitigation Services (DMS).

5.8 Endangered Species Act Protected Species

As of April 2, 2015, the United States Fish and Wildlife Service (USFWS) lists one federally protected species for Yadkin County (Table 6). A brief description of this species' habitat requirements follows, along with the Biological Conclusion rendered based on survey results in the study area. Habitat requirements for this species are based on the current best available information from referenced literature and/or USFWS.

Table 6. Federally protected species listed for Yadkin County.

Scientific Name	Common Name	Federal Status	Habitat Present	Biological Conclusion
Myotis septentrionalis	Northern long-eared bat	T	Unresolved	Unresolved

T - Threatened

Northern long-eared bat
USFWS optimal survey window: June 1 – August 15

Habitat Description: In North Carolina, the Northern long-eared bat (NLEB) occurs in the mountains, with scattered records in the Piedmont and coastal plain. In western North Carolina, NLEB spend winter hibernating in caves and mines. Since this species is not known to be a long-distance migrant, and caves and subterranean mines are extremely rare in eastern North Carolina, it is uncertain whether or where NLEB hibernate in eastern North Carolina. During the summer, NLEB roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees (typically ≥3 inches dbh). Males and non-reproductive females may also roost in cooler places, like caves and mines. This bat has also been found, rarely, roosting in structures like barns and sheds, under eaves of buildings, behind window shutters, in bridges, and in bat houses. Foraging occurs on forested hillsides and ridges, and occasionally over forest clearings, over water, and along tree-lined corridors. Mature forests may be an important habitat type for foraging.

Biological Conclusion: Unresolved
Suitable habitat for the Northern long-eared bat does exist in the study area. Forests in the study area are comprised of both live and dead trees greater than three inches dbh. The NCDOT Biological Surveys Group will be responsible for the surveys for the Northern long-eared bat.

5.9 Bald Eagle and Golden Eagle Protection Act

Habitat for the bald eagle primarily consists of mature forest in proximity to large bodies of open water for foraging. Large, dominant trees are utilized for nesting sites, typically within 1.0 mile of open water.

A desktop-GIS assessment of the project study area, as well as the area within a 1.13 mile radius (1.0 mile plus 660 feet) of the project limits, was performed on January 20, 2015 using 2010 color aerials. No water bodies large enough or sufficiently open to be considered potential feeding sources were identified. Therefore, suitable habitat for bald eagle does not exist in the study area, as it is not within 1 mile of suitable forage habitat. Additionally, a review of the NCNHP records, updated January 2015, indicated no bald eagle occurrence within 1.0 mile of the study area. Due to the lack of habitat, known occurrences, and minimal impact anticipated for this project, it has been determined that this project will not affect this species.

5.10 Endangered Species Act Candidate Species

As of April 2, 2015, the USFWS website lists no Candidate species for Yadkin County.

5.11 Essential Fish Habitat

The National Marine Fisheries Service (NMFS) has identified no essential fish habitat in the study area.

6.0 REFERENCES

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Appendix A

Figures

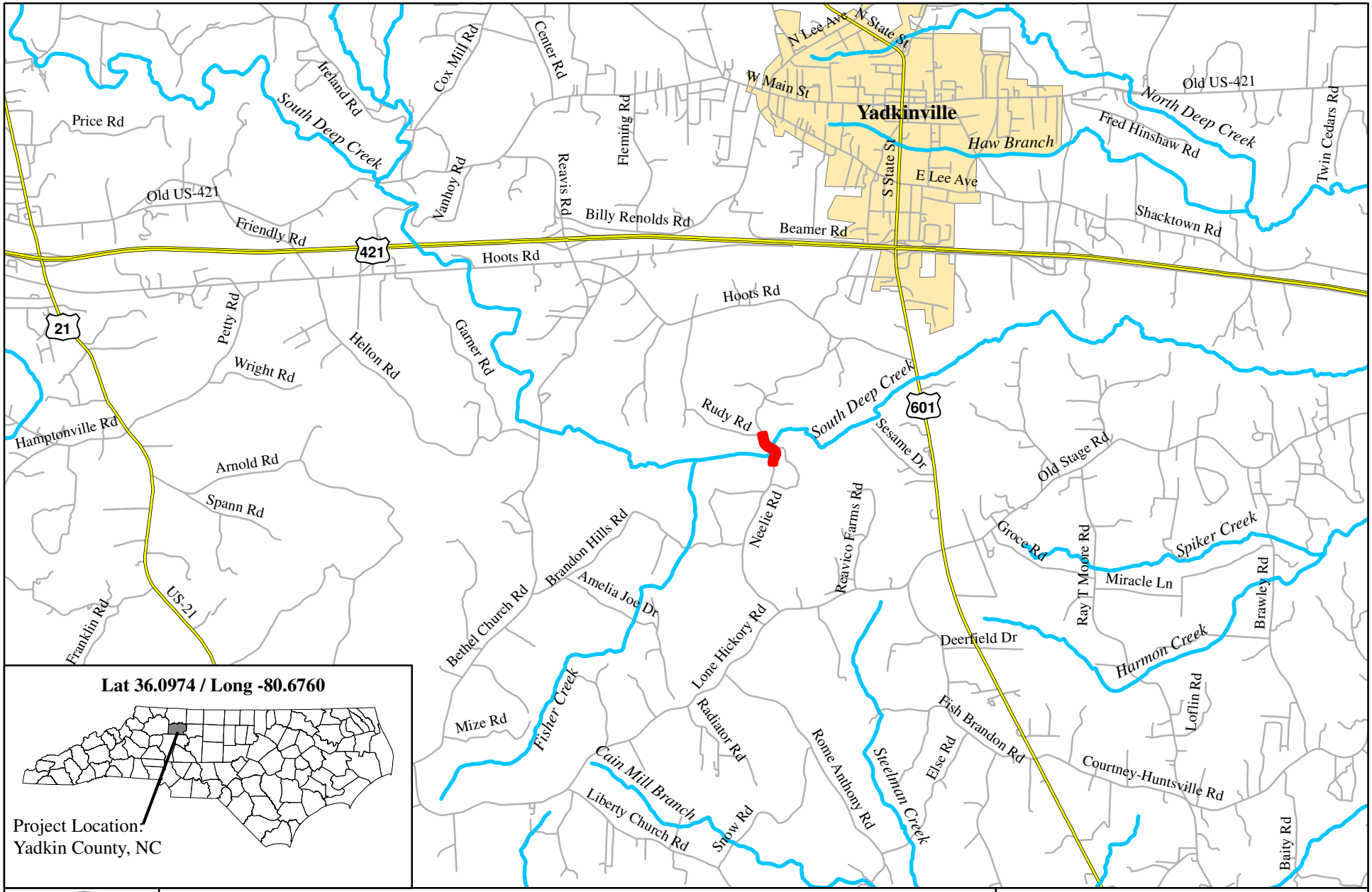


Figure 1: Vicinity Map

B-4683
Replace Bridge No. 20 on SR-1152 over South Deep Creek
Yadkin County

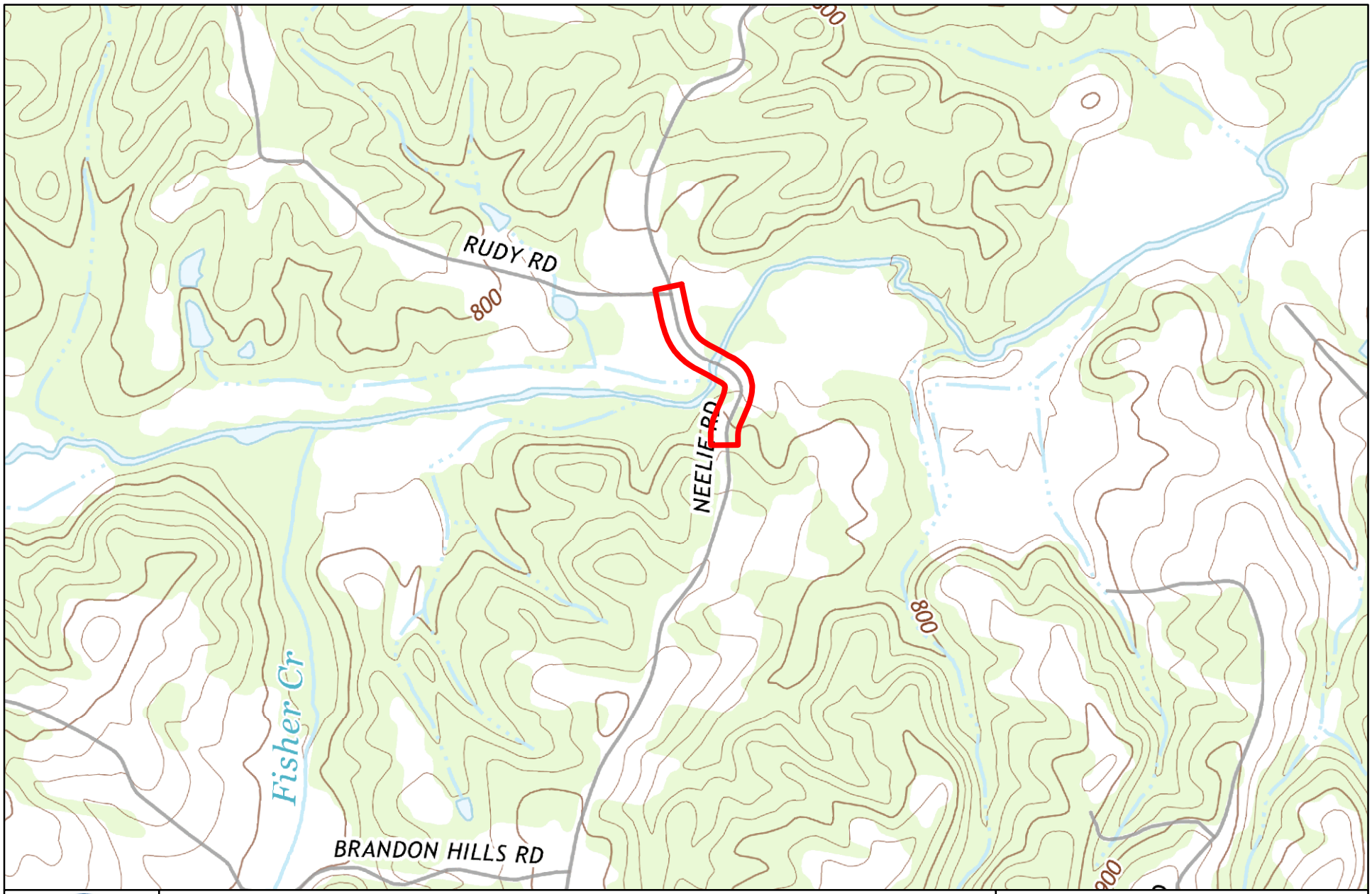


Figure 2: Project Study Area Map

B-4683
Replace Bridge No. 20 on SR-1152
over South Deep Creek
Yadkin County

N

Feet

0 50 100

2010 Statewide Aerial Photographs
April 2015

Study Area

Perennial Stream

Figure 3: Jurisdictional Features Map

B-4683
Replace Bridge No. 20 on SR-1152
over South Deep Creek
Yadkin County

N

0 50 100 Feet

2010 Statewide Aerial Photographs
April 2015

Study Area
Maintained/Disturbed
Mesic Mixed Hardwood Forest
Piedmont Alluvial Forest

Figure 4: Terrestrial Communities Map
B-4683
Replace Bridge No. 20 on SR-1152 over South Deep Creek
Yadkin County

Appendix B

Scientific Names of Species Identified in Report

Plants

Common Name	Scientific Name
American Beech	*Fagus grandifolia*
American sycamore	*Platanus occidentalis*
Chinese privet	*Ligustrum sinense*
Fescue	*Schedonorus arundinaceus*
Japanese honeysuckle	*Lonicera japonica*
Kudzu	*Pueraria lobata*
Northern red oak	*Quercus rubra*
Red cedar	*Juniperus virginiana*
River birch	*Betula nigra*
Virginia pine	*Pinus virginiana*
Yellow poplar	*Liriodendron tulipifera*

Animals

Common Name	Scientific Name
American crow	*Corvus brachyrhynchos*
American kestrel	*Falco sparverius*
Belted kingfisher	*Ceryle alcyon*
Blue jay	*Cyanocitta cristata*
Bluegill	*Lepomis macrochirus*
Bluehead chub	*Nocomis leptocephalus*
Carolina chickadee	*Poecile carolinensis*
Corn snake	*Pantherophis guttatus*
Eastern bluebird	*Sialia sialis*
Eastern box turtle	*Terrapene carolina*
Eastern cottontail	*Sylvilagus floridanus*
Eastern fence lizard	*Sceloporus undulatus*
Eastern meadowlark	*Sturnella magna*
Five-lined skink	*Eumeces anthracinus*
Gray squirrel	*Sciurus carolinensis*
Northern dusky salamander	*Desmognathus fuscus*
Raccoon	*Procyon lotor*
Rat snake	*Elaphe obsoleta*
Redbreast sunfish	*Lepomis auritus*
Redlip shiner	*Notropis chiliticus*
Satinfin shiner	*Cyprinella analostana*
Tessellated darter	*Etheostoma olmstedi*
Tufted titmouse	*Baeolophus bicolor*
Turkey vulture	*Cathartes aura*
Virginia opossum	*Didelphis virginiana*
White-tailed deer	*Odocoileus virginianus*
Yellow-rumped warbler	*Setophaga coronata*

Appendix C

Stream Forms

B4683 SA

USACE AID#_____ DWQ #_____ Site #____ (indicate on attached map)

STREAM QUALITY ASSESSMENT WORKSHEET

Provide the following information for the stream reach under assessment:

1. Applicant's name: NCDOT
2. Evaluator's name: P. May
3. Date of evaluation: 3/4/15
4. Time of evaluation: 14:15
5. Name of stream: SB
6. River basin: Yadkin
7. Approximate drainage area: 250 acres
8. Stream order: 2
9. Length of reach evaluated: 200'
10. County: Yadkin
11. Site coordinates (if known): prefer in decimal degrees.
12. Subdivision name (if any):

Latitude (ex. 34.872312): 36.0974495 Longitude (ex. –77.556611): -80.6759847

Method location determined (circle): GPS Topo Sheet (Ortho (Aerial) Photo/GIS) Other GIS Other

13. Location of reach under evaluation (note nearby roads and landmarks and attach map identifying stream(s) location):

Directly south of SR-1152 over South Deep Creek

14. Proposed channel work (if any):
15. Recent weather conditions: Rain w/in 48 hrs
16. Site conditions at time of visit: Sunny, dry
17. Identify any special waterway classifications known: ___Section 10 ___Tidal Waters ___Essential Fisheries Habitat ___Trout Waters ___Outstanding Resource Waters ___ Nutrient Sensitive Waters ✓Water Supply Watershed III (I-IV)
18. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area:
19. Does channel appear on USGS quad map? (YES) NO
20. Does channel appear on USDA Soil Survey? (YES) NO
21. Estimated watershed land use: 5 % Residential ___% Commercial ___% Industrial 25% Agricultural 70 % Forested ___% Cleared / Logged ___% Other (_____)
22. Bankfull width: 4'
23. Bank height (from bed to top of bank): 1'
24. Channel slope down center of stream: ✓Flat (0 to 2%) ___Gentle (2 to 4%) ___Moderate (4 to 10%) ___Steep (>10%)
25. Channel sinuosity: ___Straight ✓Occasional bends ___Frequent meander ___Very sinuous ___Braided channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 24 **Comments:** Perennial stream ditched through ag field with little riparian vegetation.

Evaluator's Signature _____ **Date** 3/4/15

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 06/03. To Comment, please call 919-876-8441 x 26.

B4683 SA

STREAM QUALITY ASSESSMENT WORKSHEET

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	**Presence of flow / persistent pools in stream** (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	3
	2	**Evidence of past human alteration** (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	0
	3	**Riparian zone** (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	1
	4	**Evidence of nutrient or chemical discharges** (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	1
	5	**Groundwater discharge** (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	1
	6	**Presence of adjacent floodplain** (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	0 *
	7	**Entrenchment / floodplain access** (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	1
	8	**Presence of adjacent wetlands** (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	**Channel sinuosity** (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	1
	10	**Sediment input** (extensive deposition= 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	**Size & diversity of channel bed substrate** (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	1
STABILITY	12	**Evidence of channel incision or widening** (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	2
	13	**Presence of major bank failures** (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	2
	14	**Root depth and density on banks** (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	2
	15	**Impact by agriculture, livestock, or timber production** (substantial impact =0; no evidence = max points)	0 – 5	0 – 4	0 – 5	0
HABITAT	16	**Presence of riffle-pool/ripple-pool complexes** (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	1
	17	**Habitat complexity** (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	2
	18	**Canopy coverage over streambed** (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	2
	19	**Substrate embeddedness** (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	1
BIOLOGY	20	**Presence of stream invertebrates** (see page 4) (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	1
	21	**Presence of amphibians** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	**Presence of fish** (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	**Evidence of wildlife use** (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	0
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						24

* These characteristics are not assessed in coastal streams.

* Floodplain of main stem channel (SA)

SA

NC DWQ Stream Identification Form Version 4.11

Date: 3/4/15	**Project/Site:** B 4683	**Latitude:** 36.0974495
Evaluator: P. May	**County:** Yadkin	**Longitude:** -80.6759847
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 29.5	**Stream Determination (circle one)** Ephemeral Intermittent (Perennial)	**Other** *e.g. Quad Name:*

A. Geomorphology (Subtotal = 11.5)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	2	(3)
2. Sinuosity of channel along thalweg	0	(1)	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	(1)	2	3
4. Particle size of stream substrate	0	(1)	2	3
5. Active/relict floodplain	(0) *	1	2	3
6. Depositional bars or benches	0	(1)	2	3
7. Recent alluvial deposits	0	(1) →	2	3
8. Headcuts	(0)	1	2	3
9. Grade control	0	(0.5)	1	1.5
10. Natural valley	(0)	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes = 3	

[a] artificial ditches are not rated; see discussions in manual

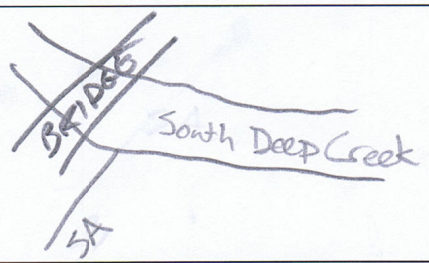
B. Hydrology (Subtotal = 8.5)				
12. Presence of Baseflow	0	1	2	(3)
13. Iron oxidizing bacteria	(0)	1	2	3
14. Leaf litter	1.5	(1)	0.5	0
15. Sediment on plants or debris	0	0.5	(1)	1.5
16. Organic debris lines or piles	0	(0.5)	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = 9.5)				
18. Fibrous roots in streambed	(3)	2	1	0
19. Rooted upland plants in streambed	(3)	2	1	0
20. Macrobenthos (note diversity and abundance)	0	(1)	2	3
21. Aquatic Mollusks	0	1	(2)	3
22. Fish	(0)	0.5	1	1.5
23. Crayfish	0	(0.5)	1	1.5
24. Amphibians	(0)	0.5	1	1.5
25. Algae	(0)	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: * Floodplain of main stem (SA), numerous snails, damselfly (D), crayfish

Sketch:



Appendix D
Qualifications of Contributors

Investigator: Rob Crowther
Education: B.S. Environmental Resources Management, 2014
Experience: Environmental Scientist, Carolina Ecosystems, Inc., 2015-Present
Field Assistant, Virginia Tech 2014
Responsibilities: Document preparation

Investigator: Chris Hopper
Education: B.S. Natural Resource Mgmt. & Engineering, 1997
Experience: Senior Scientist, Carolina Ecosystems, Inc. 2015-Present
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Robert J. Goldstein & Assoc. 1998-2011
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Investigator: Joe Sullivan
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B.A. Environmental Studies 2008
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